Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

Maureen F. Gorsen, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Arnold Schwarzenegger
Governor

March 21, 2006

Mr. Mark Brearley, Ph.D., R.G.
152 3rd Avenue South, Suite 200
P.O. Box 399
Edmonds, Washington 98020

DRAFT PRELIMINARY ENDANGERMENT ASSESSMENT REPORT FOR PUREGRO LINDEN FACILITY, LINDEN, CALIFORNIA

Dear Mr. Brearley:

The Department of Toxic Substances Control (DTSC) has reviewed the draft report entitled "Addendum to Preliminary Endangerment Assessment (PEA) and Site-Specific Risk Assessment for Commercial Scenario – PureGro Facility, Linden, California" dated February 2006. Specific DTSC comments are provided in the enclosure as provided in the PureGro Linden Facility, Voluntary Cleanup Agreement (VCA). A revised report that addresses the enclosed comments is due April 22, 2006, in accordance with the VCA. If you are unable to address the issues outlined in the comments without additional sampling at the site, please call this office to discuss the scope of work for the sampling plan that addresses the data needs specified in the attached comments.

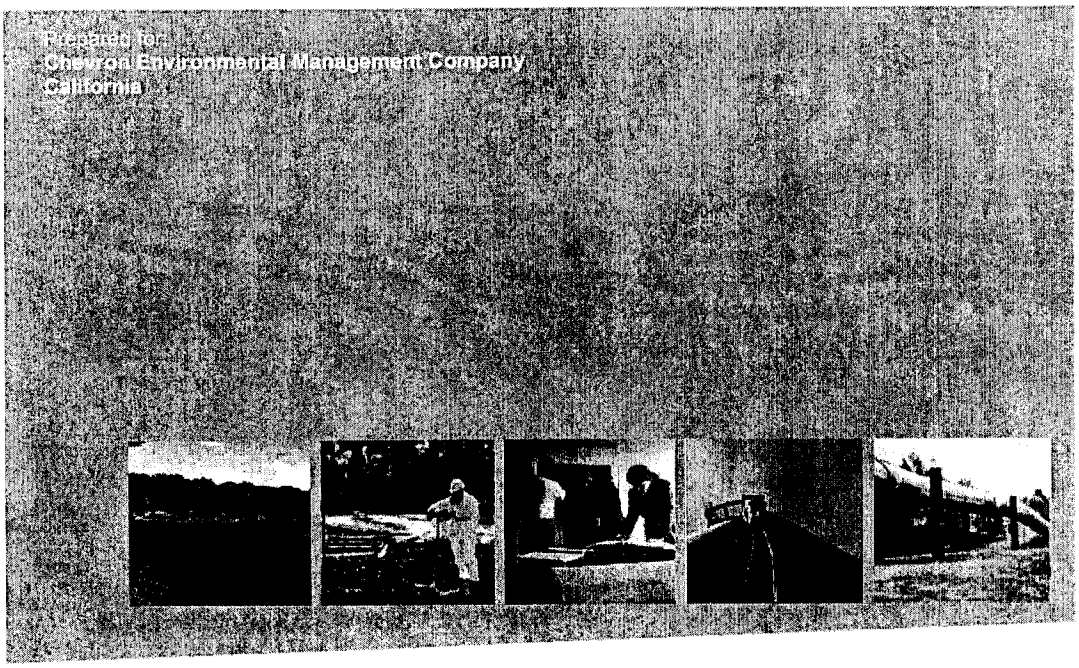
If you have any questions, please call me at (916) 255-3749.

Sincerely,

Eric Wallberg
Project Manager
Site Evaluation and Remediation Unit

cc: Mr. Eric Chase
ENSR Corporation
10411 Old Placerville Road, Suite 210
Sacramento, California 95827-2508

cc: Mr. John Warren
ENSR Corporation
10411 Old Placerville Road, Suite 210
Sacramento, California 95827-2508



Addendum to Preliminary Endangerment Assessment (PEA) and Site-Specific Risk Assessment for Commercial Scenario – PureGro Facility, Linden, California

ENSR Corporation
February 2006
06940-554-200

ENSR | AECOM

Prepared for:
Chevron Environmental Management Company
California

Addendum to Preliminary Endangerment Assessment (PEA) and Site-Specific Risk Assessment for Commercial Scenario – PureGro Facility, Linden, California Report

Comment [dtsc2]: This document seems to stand on its own, so I think we can delete the words "Addendum to."

John M. Warren, R.C.E. 34168
Senior Program Manager

Kent D. Baugh, Ph.D., P.E. #C28941
Technical Manager

ENSR Corporation
February 2006
06940-554-200

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1.0 INTRODUCTION

Comment [dtsc3]: The first section should be an Executive Summary. Please refer to Chapter three of the PEA Guidance.

This ~~addendum to ENSR's December 2004~~ Preliminary Endangerment Assessment (PEA) and additional site-specific risk assessment for a commercial scenario was conducted for the PureGro Linden site (site), located at the northwest corner of State Route 26 (a.k.a. East Main Street) and Wall Road in Linden, California. This site has been owned by several different companies over the years. Prior to 1981, the site served as a staging area and storage facility for Hughes Spray Chemical (Hughes), a small agricultural chemical company. From October 1981 to 1990, Brea Agricultural Service, Inc. (Brea) used the site for pesticide and fertilizer storage. PureGro Company (PureGro), a subsidiary of Union Oil Company of California (Unocal), purchased the former Brea property in 1990, and subsequently closed operations at the site in July 1990. The site has been inactive since 1990. It is currently vacant and fenced.

Comment [dtsc4]: Change this and any other references to this document as an addendum, as you've really redone the whole PEA.

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In December 1991, a preliminary PEA for this site was conducted by Sierra-Pacific Groundwater Consultants, Inc. (Sierra-Pacific, 1992) and submitted to the California Department of Health Services. The human health and environmental screening evaluation was not completed in this report, since additional data were being collected. On April 1, 1992, a letter from the California's Department of Toxic Substances Control (DTSC) (Megan Cambridge, Chief of the Site Evaluation Unit) stated that the report was incomplete and that an in-depth evaluation had not been performed.

Comment [dtsc5]: Include as an appendix and cite it.

In December 2004, a PEA and additional site-specific risk assessment for a commercial scenario was conducted by ENSR Corporation and submitted to the DTSC.

Comment [dtsc6]: Include as an appendix and cite it.

In April 2005, ENSR met with the DTSC to discuss ENSR's December 2004 PEA. During the April 2005 meeting, the DTSC requested that Unocal submit a Voluntary Cleanup Application and enter into a Voluntary Cleanup Agreement (VCA) with the DTSC. Additionally, the DTSC requested that Unocal revise the December 2004 PEA and provide soil data from previous soil investigations and a community profile. On June 30, 2005, the DTSC and Unocal signed a VCA for the subject site (Appendix A).

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On August 18, 2005 the DTSC, Unocal and ENSR visited and inspected the site. During the subsequent meeting, the DTSC provided Unocal and ENSR with an updated list of items to be incorporated into the addendum to the existing December 2004 PEA. These items included a risk evaluation for groundwater using the Designated Level Methodology for Waste Characterization and Cleanup Level Determination (Marshack, 1989), and draft versions of Deed Restrictions, Declaration of Covenants and an Operation and Maintenance Agreement.

Starting in August 2005, management services for the property are now handled by Chevron Environmental Management Company (Chevron). The Chevron Project Manager is Dr. Mark Brearley. See Section 2.1.

This report provides the requested added information to the December 2004 PEA. The PEA was conducted in accordance with California EPA's (CalEPA) Preliminary Endangerment Assessment Guidance Manual (CalEPA, 1994) and follows the recommended report format provided in this document. The screening level human health risk assessment incorporated in the PEA evaluates only a residential exposure scenario. Since the site has been used for commercial purposes and is expected to remain commercial, a site-specific risk assessment for a commercial scenario was also conducted. The site-specific risk assessment provides a more realistic assessment of potential risks at this site.

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2.0 SITE DESCRIPTION AND BACKGROUND

The PureGro Linden facility is fee owned and located approximately 10 miles east of the City of Stockton, California at the corner of State Route 26 and Wall Road in Linden, San Joaquin County California. The site is bordered to the north by a walnut orchard; to the east by N. Wall Road and a walnut orchard; to the south by railroad tracks, State Route 26, two residences, a walnut orchard and a protective coating company; and to the west by a Diamond of California (Diamond) walnut processing facility.

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The following information is taken mainly from the preliminary PEA conducted in 1992 (Sierra-Pacific, 1992).

2.1 Site Identification

In accordance with CalEPA (1994), the following site identification information is provided.

Site Name: Former PureGro 776140

Contact Person: Mark Brearley, Ph.D., R.G.
Project Manager, Superfund Property Management
Chevron Environmental Management Company
P.O. Box 399
Edmonds, WA 98020

Site Address: 19783 State Route 26 (a.k.a. East Main Street)
Linden, California 95236

Phone Number: No phone on-site, Contact Mark Brearley at (425) 640-7610.

Other Site Names: Brea Agricultural Service, Inc. (owner from 1981 to 1990)
Hughes Spray Chemical (owner prior to 1981)

USEPA Identification Number: None assigned.

Abandoned Site Program Information System (ASPIS) Number: 39-07-0060

Assessor's Parcel Number and Maps: Parcel Number 091-290-11. **Figure 1.** San Joaquin County Plat Map

Township, Range, Section, and Meridian: SE4, SW4, NW4, SEC14, T02N, R08E, MDBM
Linden, California 7.5-Minute Quadrangle

Land Use and Zoning: Zoning information viewed on the San Joaquin County Community Development website (San Joaquin County Community Development Department. 2002) indicates that the subject property is zoned for General Industrial (I-G), which is classified as a General Industrial Zone. This zone provides for a wide range of manufacturing, distribution, and storage uses which have moderate to high nuisance characteristics such as noise, heat, glare, odor, and vibration, and which require segregation from other land uses, and/or may require outside storage areas. Both Hughes and former Brea entities conducted commercial operations at the site. Currently, the site is vacant. Therefore, land use at the site has been historically commercial and it is assumed that the site will continue to be operated as a commercial site. Surrounding land use is zoned for General Agricultural (AG). Commercial walnut orchards lie north, east and south of the site. A Diamond walnut processing facility is located adjacent to the western property boundary. There are two residences located approximately 500 feet south of the site along E. Highway 26 and one residence located approximately 400 feet northeast of the site along N. Wall Road.

Comment [dtsc7]: The zoning information is great, but I had asked Ben to look at the County "General Plan" to identify the intended future land use in and around this area. This information is crucial if we're going to do a deed restriction for commercial land use.

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2.2 Site Maps

Figure 2 is a Site Location Map. **Figure 3** is a Facility Diagram.

2.3 Background

2.3.1 Site Status and History

PureGro purchased the property from Brea in 1990. Shortly after acquisition by PureGro, industrial equipment was removed from the site and the pesticide warehouse was cleaned. Pesticide and fertilizer rinsate tanks at the former Brea site were purged and their contents removed in accordance with current environmental laws and regulations. Between 1992 and 1999 six steel aboveground storage tanks roughly 10 feet in diameter and 23 feet in height each and debris from a demolished scale house were removed from the site. No storage or retail sale of agricultural products has taken place at the former Brea site since the company's inventory of pesticides and fertilizers was removed by PureGro in 1990. The site has been inactive since July 1990.

From October 1981 to 1990, Brea used the site for pesticide and fertilizer storage and retail sales. Brea sold bulk fertilizers and non-hazardous dormant spray. The company also sold pesticides in original, sealed, chemical product containers. No pesticide manufacturing or product formulation appears to have taken place at the site since October 1981.

Prior to 1981, this site served as a staging area and storage facility for Hughes, a small pesticide and fertilizer application firm. No list of agricultural chemical products is available for the period prior to October 1981 when the facility was operated by Hughes. However, Hughes reportedly opened and mixed pesticides products at the site.

Prior to 1995, the Stockton Terminal & Eastern Railroad operated the rail road tracks located along the southern property boundary of the site. It is likely that the rail road spur was used by Diamond and neighboring agricultural crop growers to transport crops to processing facilities but its present use is unknown.

2.3.2 Hazardous Substance/Waste Management and Information

There is little specific information on the handling and disposal of agricultural chemicals at the site. It is likely that any spills at the site would have occurred prior to 1981, when pesticide products may have been opened and mixed.

No documentation exists suggesting that any form of hazardous waste treatment has taken place at the site since 1980. Trucks, tractors, and application equipment which transported or came into direct contact with pesticides and fertilizers were washed at the site on specially designed, concrete rinse pads. Contaminated rinsates were collected and temporarily stored in rinsate holding tanks. Brea's agricultural service policy in the 1980s was to empty rinsate holding tanks every 60 days. Fertilizer rinsate was applied to local croplands, and pesticide rinsate was transported to off-site waste facilities for proper disposal.

A letter by Brea Agricultural Service, dated May 25, 1982, states that "...trucks, tractors, and various pieces of agricultural chemical and fertilizer application equipment are washed, and the water is discharged to an evaporation pond. Testing has shown these rinse waters to be non-hazardous." The company stated that pesticide-laden rinsate had not been placed in the evaporation pond.

No storage or retail sales of agricultural products have taken place at the Linden site since the Brea's inventory of pesticides and fertilizers was removed by PureGro in 1990. Shortly after acquisition by PureGro, industrial equipment was removed from the site and the pesticide warehouse was cleaned. Pesticide and fertilizer rinsate tanks at the former Brea site were purged and their contents removed in accordance with current environmental laws and regulations. Facilities currently at the site include an empty warehouse and a concrete rinse pad.

Comment [dtsc8]: Please include the specific corporate/partnership/sole proprietor identification for each of the prior owners. Also include a description of the land use prior to agricultural chemical operations. See section 3.3.4 of the PEA guidance.

Comment [dtsc9]: Is there a report reference for this activity? Please cite and list in the reference section.

Comment [dtsc10]: Cite your reference here and in the reference summary.

Comment [dtsc11]: What types? Copper sulfate is commonly sprayed on trees and copper compounds are hazardous substances. What's the source for the non-hazardous determination?

Comment [dtsc12]: Cite your reference here and in the reference summary.

Comment [dtsc13]: Reported by whom? What is the reference? Please cite it here and in the reference summary.

Comment [dtsc14]: Cite your reference here and in the reference summary. It's also likely that the spur was used to deliver bulk herbicides and pesticides to the facility.

Comment [dtsc15]: Was there waste treatment before 1980? Is there any documentation on waste management practices of Hughes?

Comment [dtsc16]: How were they specially designed?

Comment [dtsc17]: What's the reference?

Comment [dtsc18]: This contradicts the previous paragraph. A "non-hazardous" determination doesn't mean that there weren't hazardous substances in the rinsewater, just that they weren't at "Hazardous Waste" levels.

Comment [dtsc19]: What was in the inventory. Cite the inventory records here and in the reference summary. Also, for the other owners, please specify the type of chemicals, quantities, and physical processes used.

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2.3.2.1 Regulatory Status

In 1983, the Brea site in Linden was considered for listing as an EPA Superfund site. However, subsequent in-house review of relevant information and a follow-up inspection in 1983, prompted CalEPA to reconsider that assignment. There was a gradual reduction in California's Department of Health Services (DHS) involvement and concern for the Linden site through 1992. Between 1992 and 1996, regulatory oversight was transferred to the DTSC.

Comment [dtsc20]: Cite the reference here and in the reference summary.

On June 30, 2005, the DTSC and Unocal signed a voluntary cleanup agreement (VCA) for the subject site (Appendix A). The VCA provides a scope of work, tasks and schedule for PEA report approval. This report is an addendum to ENSR's December 2004 *Preliminary Endangerment Assessment (PEA) and Site-Specific Risk Assessment for Commercial Scenario* report and provides the specific information requested by the DTSC during a meeting held on August 18, 2005. ~~A copy of the VCA dated June 30, 2005 is included as Appendix A~~

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2.3.2.2 Inspection Results

As part of their Abandoned Site Project, DHS inspected and sampled soils at the site on September 8, 1982. Based on 5 grab sample analyses, they referred the site to the Hazardous Waste Management Board's Enforcement Division for further action and a recommendation for further study.

Comment [dtsc21]: Cite the reference here and in the reference summary.

On August 18, 2005, representatives from the DTSC, Unocal, and ENSR visited and inspected the site. No obvious signs of hazardous materials or conditions were noted during the inspection or subsequent meeting.

2.3.3 Apparent Problem

The analytical results for grab soil samples collected in 1982 by DHS reported elevated levels of organochlorine pesticides, namely DDD, DDE and DDT. Subsequent analytical results for grab soil samples collected in 1984 and 1986 reported these compounds. Analytical results for grab soil samples collected in 1992 reported low levels of bromacil, dieldrin and diuron. Soil samples were also tested for various organophosphorus pesticides, none of which were detected. Nitrates, sulfate and ammonia were also detected in soil samples in 1992. ~~Circumstantial evidence points to pesticide application activities of Hughes as the most likely source for residual soil impacts. One possible scenario is that a pesticide rinsate holding tank may have overflowed or spilled into the fertilizer rinsate evaporation pond adjacent to the equipment washing station. If true, the spill was likely prior to the statewide ban on the use and sale of DDT in 1973.~~

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2.3.4 Environmental Setting

2.2 Site Location & Setting

Comment [dtsc22]: This is an example of what I would expect for this section. Perhaps you could work this type of information into your format.

San Joaquin County has a Mediterranean climate with arid summers and mild winters. It has average annual rainfall of about 12 to 14 inches, most of which falls between November and March.

The area historically has been in agricultural use, but is in the process of being developed to industrial use. With the exception of a Yellow Freight truck terminal, the adjacent and nearby parcels remain in agricultural use but are zoned for industrial use.

The site is a 10-acre industrial parcel at the intersection of Paradise Road and Pescadero Avenue just inside the northeastern limits of the city of Tracy in San Joaquin County. It consists of a very long, narrow strip of

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land that is currently mostly unused except for a small complex of buildings near the extreme east end of the parcel. Continental Express, a small trucking firm occupies the buildings. (See figures 1, 2, and 3 ~~the site maps~~ for the site location and graphical details.) The company uses the facility to park heavy trucks and trailers and to perform light servicing of the vehicles.

Hydrogeology

As shown on the USGS topographic map, the area is ~~in~~ nearly flat ~~lying~~, with little topographic variation, and a very gentl~~ye~~ northerly slope. The north lot line is bounded by an unlined irrigation ditch, which lies inside a raised levee or berm. The ditch appears to be used only occasionally, and much of the year it is dry. According to a the San Joaquin County Groundwater Report (Hirata, 1999), it appears that first groundwater lies approximately 6 to 10 feet below ground surface and flows in a north to northeasterly direction. Based on soil borings completed for this PEA, ~~locally~~ the groundwater surface lies about 11 feet below grade.

Soils & Geology

Based on Page (1986), the geologic features of this portion of San Joaquin County are typical of California's Central Valley, a large northwest/southeast trending asymmetric trough bounded by mostly pre-Tertiary metamorphic, sedimentary and granitic rocks. Depth to basement rock in the Valley ranges from up to at least 6 vertical miles in the southern portions of the Central Valley (the "San Joaquin" Valley) to up to 10 miles in sediment thickness in the northern expanse of the valley (the "Sacramento" Valley). In most of San Joaquin County, with the exception of its eastern and western margins which are dominated by the foothills of the Sierra Nevada and Coast Ranges, respectively, recently (Cenozoic) deposited terrestrial, lacustrine, and marine sediments overlie older (pre-Tertiary in age) consolidated marine sediments. These older sedimentary units in turn overlie pre-Tertiary crystalline basement rocks.

The formation of soils in San Joaquin County is dependent on the sedimentary transport path from the primary sediment sources. These sediment sources are the Coastal Range to the west and the Sierra Nevada to the east of the County. Generally, the longer the transport path the greater the working of the sediments prior to deposition as soils. Along the San Joaquin River and in the delta regions west of Stockton, the low energy river and flood plain environments deposit layers of silt and clays during seasonal floods. These fine-grained sediments flocculate out of slack water as floodwaters recede. The erosion of the Coast Range forms portions of far western San Joaquin County soils and transport of these sediments is facilitated through seasonal run-off of the minor streams of the Coast Range. These soils are formed in environments similar to those of eastern San Joaquin county, i.e., alluvial fans, but tend to be less well worked in comparison to their Sierran derived counterparts due to the shorter transport path relative to Sierran derived sediments.

The USDA Soils Conservation Service *Soil Survey of San Joaquin County, California*, (McElhiney, 1992) classifies soil in San Joaquin County. The *Survey* generally classifies the soils in this area of Tracy as part of the Capay association; moderately well drained fine textured soils, very deep and subject to artificial wetness. The on-site soil is specifically classified as Capay clay, 0-2 percent slopes; a very deep, moderately well drained soil on alluvial fans. Based on soil sampling and two soil borings, most of the shallow soil consists of silt and clay.

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According to Munger (2002), and Cal-DOGR (1982), the Haley site lies within a natural gas producing field called the Tracy Gas Field. The field is productive from sands of the Tracy Formation at a depth of about 4,000 feet. Based on the available information, it does not appear that any gas wells were ever drilled on, or near, the subject property.

This information identifies the site environmental conditions that would influence the transport of site compounds from the source through identified potential exposure pathways to the exposed individual or environmental receptor. Site related compounds were detected in soil. There is no evidence of migration to groundwater.

The Linden County Water District (LCWD) services approximately 428 residential and commercial agriculture customers. The nearest production well is located approximately 1000 feet west of the site. According to the LCWD, the average depth to groundwater for the five LCWD production wells ranged between 125 feet to 135 feet during 2004. The testing data from the LCWD's four operating wells show that the wells have not been contaminated with pesticides or metals.

There are several clay layers between the shallow surface soils and the groundwater table. The clay layers range in thickness between approximately 4 feet and approximately 70 feet and may prevent the leaching of soil compounds into groundwater. The soil lithology indicates that impacts to groundwater are unlikely. Therefore, groundwater is not considered to be a potential receptor. A copy of the November, 22 2004 LCWD memorandum including county well Logs and mapped well locations is included as **Appendix B**.

Comment [dtsc23]: How can you say this? What is your source for this information? If it is the well logs from the water purveyor, that is not adequate for making site specific determinations on lithology. Site specific boring logs of a statistically significant number of borings (likely six or more) would be required to make this determination.

Less than 30% of the site is paved. It is possible that there could be airborne release of soil particles. The PEA risk assessment has evaluated inhalation of airborne soil particles. Since operations were terminated in 1990, there has been no ongoing vehicle traffic and site work to disturb soils at the site. Since soil is the only contaminated medium, this section focuses on the factors related to the soil pathway.

2.3.4.1 Topography of the Site and Surrounding Areas

Topography in the vicinity of Linden is essentially flat. The regional slope can not be discerned from the ground, but topographic contours show that the ground slopes about 10 feet/mile to the west at Linden. Low terraces crop out a few miles north, east, and south of the site.

Comment [dtsc24]: What about site specific topography? What is the source for this information? Please cite and include in the reference list. I'm going to stop commenting on references and will leave it to you to go through the rest of the document and cite them, as appropriate.

2.3.4.2 Evidence of Environmental Impacts

In an early DHS memo, field staff speculated on possible stress effects on vegetation adjacent to the fertilizer rinsate evaporation pond. Otherwise, there are no apparent negative environmental impacts associated with the detected compound concentrations.

2.3.4.3 Predominant Soil Group and Permeability of Soils

The dominant soil component name is Archerdale. The soil surface texture is silty loam clay. The hydrologic group is Class C in the Linden area and is classified as Wyman clay loam. It is a Class I agricultural soil with permeability of about 0.2 to 0.6 inches/year. The soil horizon in adjacent orchards is reportedly more than four feet thick.

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2.3.4.4 Ground Slope and Surface Runoff Potential

The site lies near the center of the ancestral flood plain of the Calaveras River. Currently, the Calaveras River is confined to a natural stream channel that flows west along the northern edge of the Holocene flood plain. At its closest point, it is 1.5 miles due north of the site.

Much of the natural flow of the Calaveras River is diverted to Mormon Slough, a narrow man-made channel that flows southwest from the Sierra Nevada foothills to the San Joaquin Delta region. Mormon Slough provides water to irrigate farms in the Stockton area. At its closest point, Mormon Slough is slightly more than one-half mile from the site. Unnamed drainage ditches and channels traverse the Holocene flood plain in the area south of Mormon Slough.

No significant stream channels or ditches drain the site and surrounding Linden area. Light rain saturates and infiltrates, whereas occasional heavy runoff flows generally to the west. Because of relatively impermeable clayey loam soils in the Linden area and flat terrain, heavy precipitation creates localized flooding.

2.3.4.5 Site Accessibility

The site is accessible by State Route 26, a well maintained rural highway that traverses eastern San Joaquin County from Stockton to Valley Springs and the Sierra Nevada foothills. The site is surrounded by a chain-link and barbed wire fence to preclude unauthorized and accidental entry.

2.3.4.6 Location of Residences and other Buildings within One Mile of the Site

The site is located about one-half mile east of Linden, a small farming town east of Stockton. It is surrounded by walnut orchards and bounded by Highway 26 and N. Wall Road. Linden Elementary School and Linden High School are located on the west side of Linden, about three-quarters of a mile west-southwest of the site. Approximately 400 private residences and commercial structures exist within one mile of the site. A community profile was prepared in accordance with Exhibit 6-2 of the DTSC Public Participation Manual dated October 2001 and mailed to the DTSC on October 26, 2005. A copy of the community profile is included as **Appendix C**.

Comment [dtsc25]: What about the proximity to national/state parks, forests, historic/landmark sites, nursing homes, retirement communities etc.? See page 3-8, section 3.3.6.3 of the PEA guidance. You also need to discuss the water and air pathways at least briefly to describe them and discuss why they may not be applicable, given the conditions present at this site.

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3.0 SAMPLING ACTIVITIES AND RESULTS

Several rounds of soil samples have been collected at the site.

DHS, 1982 – On September 8, 1992, DHS collected surface soil grab samples from five locations. All five samples were taken from a shallow evaporation pit located along the northwest edge of the property. The samples were taken to the DHS Hazardous Material Laboratory in Sacramento where they were analyzed using electron-capture gas chromatography. Each sample was tested for DDT, DDE, pH, and headspace volatile compounds. No headspace volatiles were detected using gas chromatography. **Appendix D** contains the results (Table A-1). The July 29, 1987 *Sampling Plan for Brea Agriculture Services Facility, Linden, CA* summarizes the September 1982, January 1984, and January 1986 analytical results from the respective sampling events. A copy of the plan is included as **Appendix E**.

Brea Agricultural Service, 1984 – On January 30, 1984, an employee of Brea Agricultural Services collected soil samples from eight on-site and four off-site soil boring locations. Two samples were collected from each of the 12 locations at 12-inch and 24-inch intervals. Off-site samples were collected from the orchard located adjacent to the northern property boundary of the PureGro site. Soil samples were tested for DDD, DDE, DDT and pH at California Analytical Laboratories, Inc. (Table A-2 in **Appendix D**). **See Appendix E**.

PureGro, 1986 – In January 1986, PureGro staff collected soil samples from 8 soil boring locations. Each sample was analyzed by California Analytical Laboratories, Inc. for 24 organochlorine pesticides and polychlorinated biphenyls (PCBs) using EPA method 8080. Low concentrations of DDD, DDE, DDT and dieldrin were detected in some samples. The soil samples were also tested for 14 organophosphorus pesticides using EPA method 8140, none of which were detected (Table A-3 in **Appendix D**). **Figure 4** illustrates soil sample locations and analytical results for samples collected between September 1982 and January 1986. **See Appendix E**.

Sierra-Pacific, 1992 – In January 1992, Sierra-Pacific collected 2 samples from each of 13 soil boring locations. The samples were analyzed by APPL, Inc., Fresno, California, for organochlorine and carbamate pesticides, as well as selected metals, sulfates, nitrates and total nitrogen (Table A-4 in **Appendix D**). Amongst the pesticides, bromacil and diuron were detected in some of the samples. Arsenic and zinc were detected in some samples, as well as nitrate and sulfate. **Figure 5** illustrates soil sample locations and analytical results for samples collected in January 1992. The February 17, 1992 *Preliminary Analytical Results* report summarizes the January 20, 1992 analytical results for OCL pesticides, Herbicides, and Carbamates. A copy of the report is included as **Appendix F**.

The April 14, 1992 *Phase 2 Work Proposal* summarizes the January 20,1992 analytical results for arsenic, copper, zinc, nitrate, sulfate, and Total Kjedahl nitrogen (TKN). A copy of the report is included as **Appendix G**.

Sierra-Pacific, 1992 – In May 1992, Sierra-Pacific performed field testing for nitrate and ammonia. EM Quest test strips were used in the field to determine gross nitrate and ammonia concentrations (Table A-5 in **Appendix D**). **Figure 6** illustrates soil sample locations and analytical results for samples collected in May 1992. The January 12, 1993 *PureGro Linden Facility Workplan* includes the May 1992 soil sample analytical results for nitrates, nitrate and nitrite, ammonia, and EM QUEST® test strip results for nitrites. A copy of the workplan is included as **Appendix H**.

Comment [dtsc26]: The most significant deficiency in this report is in sampling and reporting. There is almost no adequate basis for making decisions or recommendations. There is anecdotal information on much of the sampling results, and very little in the way of valid and verifiable data. I told Ben that I would be willing to look at historical field sampling plans and analytical reports if they could be found. Absent that, I told him you would need to do additional sampling to provide the data needed to make the land-use decision we're trying to make. The information in this section is fine for use in developing a sampling plan, but it is not adequate for DTSC to make a land-use decision, even though you intend to place a deed restriction on the property. In order for a deed restriction to be a final remedy for the site, you must have adequate characterization of the contaminants that are to be left in-place. With that in-hand, you can then survey the area of contamination and restrict the use of the property. Additionally, if we had adequate data that could validate these historic contaminant concentrations, the 7.3E-06 cancer risk is well within our acceptable risk range for unrestricted land use.

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Comment [dtsc27]: I didn't have our toxicologist review this because we don't have adequate data to input into the risk models.

4.0 HUMAN HEALTH SCREENING RISK ASSESSMENT

Consistent with PEA guidance (CalEPA, 1994), a screening level risk assessment was conducted to provide an estimate of the potential human health and ecological risk from exposure to soil at the PureGro Linden site. The human health risk assessment (HHRA) was conducted using the equations provided in the PEA guidance, and in comments received from CalEPA's DTSC on previous PEA evaluations. These equations provide a conservative estimate of the potential chronic risk from affected media through exposure pathways that are most frequently encountered in a residential setting. The default exposure factors contained in the PEA guidance (CalEPA, 1994) are based on residential exposure, which is conservative for a commercial site. As stated in CalEPA (1994), this screening-level evaluation is used to assist the risk manager in deciding whether further site characterization, risk management, or remediation is necessary.

The components of the screening level HHRA include: 1) identification of exposure pathways and media of concern; 2) identification of compounds of potential concern (COPCs); 3) toxicity assessment; and 4) risk characterization.

In addition to the human health screening level assessment, PEA guidance requires a qualitative assessment of ecological risk for each of the media of concern at the site.

4.1 Exposure Pathways and Media of Concern

A conceptual site model is used to identify complete exposure pathways for the screening level evaluation of chronic health risks. The site is zoned general industrial and is likely to remain commercial. Potential future receptors are commercial workers and construction workers at the site. Potential exposure pathways for these receptors include dermal contact with and incidental ingestion of soil, and inhalation of airborne dust. The vegetation ingestion pathway was not evaluated because it is unlikely that vegetables will be grown and eaten at a commercial site. The groundwater exposure pathway was also not considered complete. Since average depth to groundwater beneath the site is approximately 125 to 135 feet below ground surface, contact with groundwater is unlikely. In addition, there is no evidence of impact to groundwater.

The PEA evaluation considers exposure to a residential child and adult, and assumes unlimited access to site soil. Therefore, use of the PEA equations provides a conservative estimate of risk to future receptors at the Site. The PEA equations were used to estimate risks from exposure to soil through dermal contact, incidental ingestion and inhalation of fugitive dust. **Figure 7** illustrates the conceptual site model.

4.2 Identification of Compounds of Potential Concern

All of the detected organic and inorganic compounds were selected as COPCs. Table 1 shows the list of COPCs, and their maximum detected concentrations, which were used as the exposure point concentrations (EPCs), in accordance with PEA guidance (CalEPA, 1994). It is possible that the metals, arsenic and zinc, could be background levels. However, no site-specific background data are available for comparison; therefore these metals were carried through the risk assessment.

4.3 Toxicity Assessment

The purpose of the toxicity assessment is to identify the types of adverse health effects a COPC may potentially cause, and to define the relationship between the dose of a compound and the likelihood or magnitude of an adverse effect (response). Adverse effects are characterized by U.S. EPA as potentially carcinogenic or noncarcinogenic. The hierarchy of toxicity value sources used in this screening evaluation are: CalEPA (CalEPA, 2004 and 2003), U.S. EPA's Integrated Risk Information System (IRIS; U.S. EPA, 2004),

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U.S. EPA's Health Effects Assessment System (HEAST; U.S. EPA, 1997) and the National Center for Environmental Assessment (NCEA).

The toxicity value for a potential carcinogen is called a cancer slope factor (CSF) and is expressed in units of $(mg/kg\text{-}day)^{-1}$. CSFs are available for oral and inhalation exposures. The oral CSFs were also used to evaluate dermal exposure, since separate dermal toxicity values have not been developed. When calculating risks from dermal exposure, a dermal absorption factor was used to account for the generally lower absorption of a compound through the skin. The dermal absorption factors used in this screening evaluation are listed in the PEA guidance (Appendix A, Table 2, CalEPA 1994). For compounds not listed in this table, appropriate surrogates were selected. Table 2 lists the oral and inhalation CSFs for potential carcinogens and the dermal absorption factors.

The toxicity values for noncarcinogenic effects are called Reference Doses (RfDs) for oral exposure and Reference Concentrations (RfCs) for inhalation exposure. RfDs are expressed in units of milligrams of compound per kilogram body weight per day (mg/kg-day). RfCs are expressed in units of mg/m^3 (or $\mu g/m^3$). As specified in CalEPA (1994), the RfCs were converted to equivalent RfD values using U.S. EPA's standard inhalation dose conversion factors of an inhalation rate of 20 m^3/day and a body weight of 70 kilograms. The oral RfDs were also used to evaluate dermal exposure using dermal absorption factors. For compounds lacking RfCs, the oral RfDs were used as inhalation RfDs based on route-to-route extrapolation, as cited in the Region 9 Preliminary Remediation Goal (PRG) Table (U.S. EPA, 2002). Table 2 lists the oral and inhalation RfDs for COPCs detected in soil and the dermal absorption factors.

There are no toxicity values for bromacil listed in any of the CalEPA or U.S. EPA sources for toxicity values. However, U.S. EPA's Office of Pesticides Programs has developed an RfD for bromacil (U.S. EPA, 1994). The recommended RfD is 0.1 mg/kg-day. This value was calculated by using the No Observed Adverse Effects Level (NOAEL) in a 2-year feeding study in rats (250 ppm; 9.82 mg/kg-day), and dividing by an uncertainty factor of 100. There is no cancer slope factor for bromacil. Bromacil was classified as Group C, possible human carcinogen, based on the increased incidence of liver tumors in male mice, and thyroid tumors in male rats. U.S. EPA recommends that the RfD approach should be used for the quantification of human risk for bromacil (U.S. EPA, 1994).

There are no toxicity values for sulfate listed in any sources. Therefore, sulfate has not been evaluated quantitatively in the risk assessment.

4.4 Risk Characterization

For each COPC, the PEA calculates the excess lifetime cancer risk (ELCR) for potentially carcinogenic compounds, and a hazard quotient (HQ) for noncarcinogenic compounds. CalEPA (1994) provides risk and hazard equations that have been simplified by incorporating conservative default values. The CalEPA (1994) equations were used to calculate potential risks from exposure to COPCs in soil. The exposure pathways relevant to soil are ingestion, dermal contact and inhalation of particulates in outdoor air. The potential risks from all COPCs and exposure pathways were added together to develop a cumulative risk assessment for the site.

The models used for the inhalation, dermal contact and ingestion pathways are shown below along with their foundational assumptions, which provide a conservative estimate of chronic health risk or hazard.

4.4.1 Ingestion and Dermal Contact

The maximum detected concentration of a COPC in soil was used as input data into the ingestion and dermal contact equations. Potential risks from ingestion of and dermal contact with soil were calculated using the following equations for risk and hazard (Figure 2-3, CalEPA, 1994; Comments from DTSC, May, 2003):

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Risk = (CSFo * Cs * ($1.57E^{-6}$)) + (CSFo * Cs * ($3.71E^{-6}$) * ABS)

Hazard = (Cs/RfDo * ($1.28E^{-5}$)) + (Cs/RfDo * ($3.86E^{-5}$) * ABS)

CSFo = oral cancer slope factor (1/mg/kg-day) (**Table 2**)

Cs = concentration in soil (mg/kg)

RfDo = oral reference dose (mg/kg-day) (**Table 2**)

ABS = absorption fraction (dimensionless)

The constants in the above equations represent the default exposure factors for a resident at the site. The following default exposure factors (Figure 5, Appendix B, CalEPA, 1994; DTSC, 2000, Comments from DTSC, May, 2003) for the ingestion and dermal contact pathways were used in estimating the potential chronic risk or hazard:

Default Exposure Factors: Risk Assessment

- Exposure Duration - 24 years for Adults; 6 years for Children;
- Exposure Frequency (ingestion) - 350 days/year;
- Exposure Frequency (dermal contact) - 100 days/year (adults) and 350 days/year (children);
- Incidental Soil Ingestion Rate - 100 mg/day (adults) and 200 mg/day (children)
- Exposed Skin Area - 5,700 cm^2 (adult) and 2,900 cm^2 (children);
- Soil Adherence Factor – 0.07 mg/cm2 (adult) and 0.2 mg/cm^2 (children); and,
- Averaging Time - 70 years

Default Exposure Factors: Hazard Assessment

- Exposure Duration - 6 years for children (birth to six years);
- Exposure Frequency (ingestion and dermal contact) - 350 days/year;
- Incidental Soil Ingestion Rate - 200 mg/day (children)
- Exposed Skin Area - 2,900 cm^2 (children);
- Soil Adherence Factor – 0.2 mg/cm^2 (children); and,
- Averaging Time - 6 years

These default exposure factors provide a conservative estimate of chronic risk to human health through the ingestion and dermal contact pathway. The calculations of potential cancer risk and noncancer hazard through the soil ingestion and dermal contact exposure pathway are provided in **Tables 3a** and **3b**, respectively.

4.4.2 Inhalation Pathway

Potential risks through the inhalation pathway were calculated using soil data. According to PEA guidance, potential risks from the inhalation pathway are calculated for non-VOCs evaluated as particulates in outdoor air and for VOCs that could volatilize into outdoor air. **Table 4** lists the COPCs and identifies which ones are VOCs, according to the definition provided in CalEPA (1994). None of the COPCs were identified as VOCs.

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The maximum detected concentration of a COPC in soil was used as input data into the equations for predicting outdoor air concentrations. Since none of the COPCs are VOCs, volatilization into indoor air is not a concern.

Particulate concentrations in air were calculated using the approach recommended by the DTSC in a comment letter on another PEA document. This approach involves using a particulate emission factor (PEF) as described in U.S. EPA's Soil Screening Guidance (U.S. EPA, 1996). As stated by the DTSC, this approach provides more reasonable estimates of particulates in outdoor air than the conservative approach presented in CalEPA (1994). Specifically, particulates in outdoor air are estimated using the default PEF of 1.316×10^9 m^3/kg (U.S. EPA, 1996) that relates the compound concentration in soil with the concentration of respirable particles in air.

Table 4 shows the calculated outdoor air concentrations. It is assumed that 100 percent of the particulates have the same compound concentration as the highest soil value. These assumptions of respirable portion and contaminant loading across the entire site provide a conservative assessment of the potential risk.

After calculating potential air concentrations of compounds in soil, the risk or hazard from inhalation was calculated using the following equations (Figure 2-4, CalEPA, 1994):

Risk = CSFi * Ca * 0.149

Hazard = (Ca/RfDi) * 0.639

CSfi = inhalation cancer slope factor (1/mg/kg-day) (**Table 2**)

Ca = concentration in air (mg/m^3)

RfDi = inhalation reference dose (mg/kg-day) (**Table 2**)

The constants in these equations (0.149 or 0.639) represent the following default exposure assumptions (Figure 7, Appendix B, CalEPA, 1994):

Default Exposure Factors: Risk Assessment

- Exposure Duration - 24 years for Adults; 6 years for Children;
- Exposure Frequency - 350 days/year;
- Inhalation rate - 20 m^3/day (adults); 10 m^3/day (children); and,
- Averaging Time - 70 years

Default Exposure Factors: Hazard Assessment

- Exposure Duration - 6 years for children (birth to six years);
- Exposure Frequency - 350 days/year;
- Inhalation rate - m^3/day (children); and,
- Averaging Time - 6 years

The calculations of potential cancer risk and noncancer hazard through the outdoor air inhalation pathway are provided in **Tables 5a** and **5b**, respectively.

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In addition to the PEA equations, a screening level evaluation of soil leaching to groundwater was also conducted. This evaluation is discussed in Section 5.2.4.

4.4.3 Results of PEA Screening Evaluation

Using the PEA equations shown above, potential cancer risks and noncancer hazards were calculated for all pathways.

4.4.3.1 Cancer Risk

The estimated cancer risk level is the upper-bound likelihood, over and above the background cancer rate, that a receptor will develop cancer in his or her lifetime as a result of exposure to a compound in environmental media at the site. The cancer risk value is expressed as a probability of contracting cancer (e.g., 10^{-6}, or one in one million). In current regulatory risk assessment, it is assumed that cancer risks are additive or cumulative. The estimated cancer risk for ingestion and dermal contact was added to the inhalation risks to develop a cumulative risk estimate for soil. The PEA guidance document (CalEPA, 1994) states that a cancer risk level less than 1×10^{-6} indicates that the compounds do not pose a risk to human health. If the estimated risk of the compounds is above these values then it may be necessary to conduct more refined risk evaluations.

4.4.3.2 Noncancer Hazard

The potential for exposure to a compound to result in adverse noncarcinogenic health effects is estimated for each compound by its hazard quotient (HQ). Hazard quotients for a given pathway are summed to provide a Hazard Index (HI). Pathway HIs are summed to provide a total receptor HI. The PEA guidance document (CalEPA, 1994) states that a HI less than 1 indicates that the compounds do not pose a risk to human health.

4.4.3.3 Cancer Risk and Noncancer Hazard Results

Table 6 summarizes the potential excess lifetime cancer risk (ELCR) and HI for site soil. The total potential ELCR of 7.3×10^{-6} exceeds the PEA acceptable cancer risk threshold of 1×10^{-6}. The accidence is mainly due to DDT and DDE in soil through the soil contact pathway. Arsenic and dieldrin are also close to the threshold of 1×10^{-6}. These risk estimates are based on maximum detected concentrations, and the sample locations associated with these concentrations are shown in **Table 1**. It should be noted that arsenic was detected only once in 13 samples, and the concentration detected is likely to be similar to background levels.

The total potential HI of 0.32 is below the PEA threshold of 1. Therefore, there is no unacceptable noncancer risk at this site.

4.4.4 Uncertainty Assessment

The objective of this section is to provide an understanding of the sources of uncertainty in the risk screening evaluation to facilitate the assessment of remedial actions at the Site.

Exposure Pathways – The PEA evaluates residential exposure, which is very conservative for this site. This site has been commercial for over twenty-three years, and is likely to remain commercial. Potential risks to workers are likely to be lower than the risk estimated here for residents. The additional site-specific commercial scenario risk assessment shows that potential risks to commercial workers are less than the PEA thresholds.

Identification of COPCs - All detected compounds were selected as COPCs for further evaluation in the risk assessment. Because of the lack of site-specific background data, no inorganics in soil were screened out. Therefore, the risk assessment likely includes all the compounds that could pose potential risks.

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Toxicity Assessment - Use of RfDs and CSFs is subject to several types of uncertainties. Toxicity values are largely derived from animal studies. To the extent that humans differ from animals, the site-specific risk estimates based on animal studies may not reflect actual risks to potentially exposed humans. The methods used to develop RfDs incorporate "uncertainty factors" and are intended to be conservative. CSFs are derived assuming that there is no threshold for carcinogenic effects. CalEPA also assumes route to route extrapolation from the oral route of exposure to the inhalation route of exposure in the absence of an inhalation dose-response value. These estimates may result in an overestimation or underestimation of risk.

Risk Characterization - The PEA guidance (CalEPA 1994) uses residential exposure assumptions to provide a conservative screening level assessment. Since this subject site is expected to remain commercial, the exposure potential is much lower than residential exposure. EPCs used in the equations were also conservative, in that the maximum detected concentrations were used in calculating potential carcinogenic and noncarcinogenic risk.

The total estimated potential cancer risk is above the PEA accepted level of $1x10^{-6}$. Given the conservative exposure assumptions used in the PEA equations, it is possible that more realistic risk estimates would be lower than $1x10^{-6}$. The noncancer hazards, even using the conservative exposure assumptions, were less than the threshold of 1.

4.5 Qualitative Ecological Assessment

The site has been industrial/commercial for over twenty–three years, and is expected to remain so. Much of the site is paved. It is bounded by agricultural orchards. There are no surface water bodies nearby that have been impacted. Groundwater is also not impacted by site-related compounds. Exposure to ecological receptors is likely to be limited.

Comment [dtsc28]: This section is very weak. What are the potential ecological receptors (check with fish and game)? The ingestion and inhalation pathways may be present for these receptors. Please expand on this section (see section 3.3.9 of the PEA Guidance).

4.6 Risk Assessment Conclusions

Based on the results of the PEA screening assessment of potential risk, the following conclusions regarding risk are provided:

- The total noncancer Hazard Index estimated at this site is less than the target HI of 1. Therefore, the site does not pose excess noncancer risks.
- The total potential ELCR of $7.3x10^{-6}$ exceeds the PEA acceptable cancer risk threshold of $1x10^{-6}$. The exceedance is mainly due to DDT and DDE in soil through the soil contact pathway. These risk estimates are based on maximum detected concentrations, and the sample locations associated with these concentrations are shown in Table 1.
- Arsenic and dieldrin are also close to the threshold of $1x10^{-6}$. It should be noted that arsenic was detected only once in 13 samples, and the concentration detected is likely to be similar to background levels.
- The PEA equations provide a conservative estimate of the potential chronic risk from affected media through exposure pathways that are most frequently encountered in a residential setting. The default exposure factors contained in the PEA guidance (CalEPA, 1994) are based on residential exposure, which is conservative for a commercial site. Since the estimated cancer risk exceeds the cancer risk threshold, restrictive measures should be taken to limit the cancer risk at the site Chevron intends to place commercial use deed restrictions on the property. Deed restrictions for the property will include a covenant to restrict use and an operations and maintenance agreement.

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5.0 SITE-SPECIFIC RISK ASSESSMENT FOR A COMMERCIAL SCENARIO

The screening level human health risk assessment conducted in accordance with PEA guidance indicated the need for further action. One of the options for further action is to conduct a more refined risk assessment. The PEA risk assessment considers only a residential scenario. A residential scenario is not appropriate for the PureGro Linden site, which has been commercial for a long time and is expected to remain commercial. Therefore, a site-specific risk assessment was conducted assuming a commercial scenario.

This commercial scenario risk assessment was conducted in accordance with U.S. EPA's Risk Assessment Guidance for Superfund (U.S. EPA, 1989). The four main steps of the risk assessment process include: Data Evaluation, Toxicity Assessment, Exposure Assessment and Risk Characterization. The Data Evaluation and Toxicity Assessment steps are identical to the PEA residential risk assessment. The maximum detected compound concentrations in soil were also used as exposure point concentrations for the site-specific risk assessment. The same set of toxicity values for carcinogenic and noncarcinogenic effects were also used in the site-specific risk assessment. Therefore, the Data Evaluation and Toxicity Assessment discussions are not repeated here.

5.1 Exposure Assessment

In accordance with the Conceptual Site Model (**Figure 7**), it was assumed that a commercial outdoor worker could contact the soil. The site has been used for commercial purposes for a long time, and is likely to remain commercial. Potential exposure pathways for a commercial worker include dermal contact with and incidental ingestion of soil, and inhalation of airborne dust. The groundwater exposure pathway is incomplete, since there is no evidence of impact to groundwater.

Tables 7a and **7b** show exposure assumptions for the commercial outdoor worker. These are conservative default exposure assumptions from U.S. EPA guidance documents, such as the Exposure Factors Handbook (U.S. EPA, 1997b).

Similar to the PEA residential risk assessment, it was assumed that the exposure point concentrations of the COPCs in soil are the maximum detected concentrations. For the dust inhalation pathway, particulate concentrations in air were calculated as shown in the PEA residential risk assessment. **Table 8** lists the exposure point concentrations in soil and air used for the commercial worker.

To estimate the potential risk to human health that may be posed by the presence of COPCs at the site, it is first necessary to estimate the potential exposure dose of each COPC. The exposure dose is estimated for each compound via each exposure pathway by which the receptor is assumed to be exposed. Exposure dose equations combine the estimates of compound concentration in the environmental medium of interest with assumptions regarding the type and magnitude of each receptor's potential exposure to provide a numerical estimate of the exposure dose. The exposure dose is defined as the amount of COPC taken into the receptor and is expressed in units of milligrams of COPC per kilogram of body weight per day (mg/kg-day).

Exposure doses are defined differently for potential carcinogenic and noncarcinogenic effects. The Chronic Average Daily Dose (CADD) is used to estimate a receptor's potential intake from exposure to a COPC with noncarcinogenic effects. According to U.S. EPA (1989), the CADD should be calculated by averaging the dose over the period of time for which the receptor is assumed to be exposed. Therefore, the averaging period is the same as the exposure duration. For COPCs with potential carcinogenic effects, however, the Lifetime Average Daily Dose (LADD) is employed to estimate potential exposures. In accordance with U.S. EPA (1989) guidance, the LADD is calculated by averaging exposure over the receptor's assumed lifetime (70

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years). Therefore, the averaging period is the same as the receptor's assumed lifetime. The standardized equations for estimating a receptor's average daily dose (both lifetime and chronic) are presented below.

5.1.1 Estimating Potential Exposure from Ingestion of and Dermal Contact with Soil

Average Daily Dose (Lifetime and Chronic) Following Incidental Ingestion of Soil (mg/kg-day):

$$ADD = \frac{CS \times IR \times EF \times ED \times CF}{BW \times AT}$$

where:

ADD = Average Daily Dose (mg/kg-day)
CS = Soil concentration (mg/kg soil)
IR = Ingestion rate (mg soil/day)
EF = Exposure frequency (days)
ED = Exposure duration (year)
CF = Unit conversion factor (kg soil/10^6 mg soil)
BW = Body weight (kg)
AT = Averaging time (days)

Average Daily Dose (Lifetime and Chronic) Following Dermal Contact with Soil (mg/kg-day):

$$ADD = \frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$$

where:

ADD = Average Daily Dose (mg/kg-day)
CS = Soil concentration (mg/kg soil)
SA = Exposed skin surface area (cm^2/day)
AF = Soil to skin adherence factor (mg soil/cm^2)
EF = Exposure frequency (days)
ED = Exposure duration (year)
DAF = Dermal Absorption Fraction (unit less)
CF = Unit conversion factor (kg soil/10^6 mg soil)
BW = Body weight (kg)
AT = Averaging time (days)

5.1.2 Estimating Potential Exposure via Inhalation

Average Daily Dose (Lifetime and Chronic) Following Inhalation of COPC (mg/kg-day):

$$ADD = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

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where:

ADD	=	Average Daily Dose (mg/kg-day)
CA	=	Air concentration (mg/m^3)
IR	=	Inhalation rate (m^3 /hr)
ET	=	Exposure time (hours/day)
EF	=	Exposure frequency (days)
ED	=	Exposure duration (year)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

Risk calculations using these equations are shown in **Appendix I**.

5.2 Risk Characterization

The potential risk to human health associated with exposure to COPCs in environmental media at the site is evaluated in this step of the risk assessment process. Similar to the PEA residential risk assessment, both carcinogenic and noncarcinogenic risks were estimated.

5.2.1 Cancer Risk

The purpose of carcinogenic risk characterization is to estimate the upper-bound likelihood, over and above the background cancer rate, that a receptor will develop cancer in his or her lifetime as a result of exposure to a compound in environmental media at the site. The Excess Lifetime Cancer Risk (ELCR) is the likelihood over and above the background cancer rate, which currently in the U.S. is between 1 in 3 and 1 in 4 (Landis et al., 1998), that an individual will contract cancer in his or her lifetime. The risk value is expressed as a probability (e.g., 10^{-6}, or one in one million).

The relationship between the ELCR and the LADD (discussed in Section 5.1) of a compound may be expressed as:

$$ELCR = 1\text{-}e^{-(CSF \times LADD)}$$

When the product of the CSF and the LADD is much greater than 1, the ELCR approaches 1 (i.e., 100 percent probability). When the product is less than 0.01 (one chance in 100), the equation can be closely approximated by:

$$ELCR = LADD\ (mg/kg\text{-}day) \times CSF\ (mg/kg\text{-}day)^{-1}$$

The product of the CSF and the LADD is unit less, and provides an upper-bound estimate of the potential carcinogenic risk associated with a receptor's exposure to that compound via that pathway.

PEA guidance (CalEPA, 1994) states that a cancer risk level less than $1x10^{-6}$ indicates that the site compounds do not pose a risk to human health. U.S. EPA compares sites risks against a risk range of $1x10^{-4}$ to $1x10^{-6}$ (U.S. EPA, 1989).

5.2.2 Noncancer Hazard

The potential for exposure to a compound to result in adverse noncarcinogenic health effects is estimated for each receptor by comparing the CADD for each COPC with the RfD for that COPC. The resulting ratio, which is unit less, is known as the Hazard Quotient (HQ) for that compound. The HQ is calculated using the following equation:

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$$HQ = \frac{CADD(mg/kg-day)}{RfD(mg/kg-day)}$$

HQs are summed to provide a total receptor HI. PEA guidance (CalEPA, 1994) and U.S. EPA (1989) state that a HI less than 1 indicates that the compounds do not pose a risk to human health.

5.2.3 Cancer Risk and Noncancer Hazard Results

Table 9 summarizes the cancer risk and noncancer HI for the commercial outdoor worker. The total potential cancer risk of 7.8×10^{-7} is lower than the PEA acceptable cancer risk threshold of 1×10^{-6}. The total potential HI of 0.011 is below the PEA HI threshold of 1. These results show that the site does not pose unacceptable risks to a commercial worker.

5.2.4 Total Designated Level

In addition to the risk calculations, the potential for constituents in soil to leach into groundwater above groundwater-protective levels was also evaluated. In accordance with (Marshack 1989), total designated levels were calculated for arsenic and nitrate (measured as nitrogen). These were the only two constituents to have water quality goals and environmental attenuation factors, therefore total designated levels were calculated for only these two constituents. As shown in (Marshack 1989), total designated levels are calculated by multiplying the water quality goal with the environmental attenuation factor and the leachability factor. **Table 10** summarizes the total designated levels for arsenic and nitrate. These levels were compared with the maximum detected soil concentrations of those constituents. The total designated level for arsenic of 500 mg/kg is higher than the maximum detected concentration of 0.052 mg/kg of arsenic that was reported in soils at the site. The total designated level for nitrate (measured as nitrogen) of 100,000 mg/kg is higher than the maximum detected concentration of 3,000 mg/kg of nitrate that was reported in soils at the site. These results show that soils at the site should not be classified as a designated waste, since the constituents of concern do not exceed the total designated levels.

5.3 Site-Specific Risk Assessment Conclusions

The PEA residential risk assessment showed potential cancer risks exceeding the PEA acceptable cancer risk threshold of 1×10^{-6}. A residential scenario is very conservative for this site, which has been commercial for a long time and is likely to remain commercial. Therefore, a site-specific risk assessment evaluating a commercial worker was conducted. The results of this risk assessment showed that, under a commercial scenario, the compounds present at the site do not pose unacceptable carcinogenic or noncarcinogenic risks.

Designated Level Methodology calculations were completed to determine soil cleanup levels based on the threat that the chemical constituents in the soil may pose to beneficial uses of waters of the state. Total Designated levels of arsenic and nitrate (measured as nitrogen) were calculated for comparison with the total constituent concentrations in the soils using the most conservative environmental attenuation and leachability factors contained in the Designated Level Methodology guidance (Marshack, 1989).

Total concentrations of arsenic and nitrate (measured as nitrogen) in soils do not exceed the calculated Total Designated Levels for those constituents in soils, therefore, the soils should not be classified as a designated waste.

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6.0 DRAFT COVENANTS TO RESTRICT USE OF THE PROPERTY

~~The covenants and restrictions (covenants) described in sections 6.0 through section 7.1 were proposed by the DTSC~~. These draft covenants are proposed to be included in a separate document entitled "COVENANT TO RESTRICT USE OF PROPERTY ENVIRONMENTAL RESTRICTION", which when finalized, will be recorded in the San Joaquin County Recorders office.

Implementation and Enforcement Plan Requirements Section 67391.1 of Title 22, Division 4.5, Chapter 39 of the California Code of Regulations titled "Requirements for land Use Covenants" requires an implementation and enforcement plan to address the monitoring and maintenance requirements necessary to ensure that prohibited uses are not occurring on the deed restricted property. The elements of the implementation and enforcement plan for the property are described in sections 6.0 through section 7.1 of this document. Elements of the implementation and enforcement plan are also described in the Operations and Maintenance (O&M) Agreement described in sections 8.0 through section 8.19 of this document.

6.1 Prohibited Uses. The property shall not be used for any of the following purposes:

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation.

(b) A hospital for humans.

(c) A public or private school for persons under 21 years of age.

(d) A day care center for children

6.2 Soil Management.

(a) No activities that will disturb the soil at or below the ground surface (e.g., excavation, grading, removal, trenching, filling, earth movement or mining) shall be allowed on the property without a Soil Management Plan and a Health and Safety Plan approved by the DTSC.

6.3 Prohibited Activities. The following activities shall not be conducted at the property.

(a) Raising of food (cattle, food crops).

(b) Drilling for water, oil, or gas without prior written approval by the DTSC.

(c) Disturbance of naturally occurring vegetation unless required for fire safety, or as part of fire suppression activities, or as part of a maintenance plan to ensure the continued visibility of the signage related to this deed restriction.

(d) Use of the area for any recreational purpose that would entail human entry onto the property (e.g., a golf course).

(e) Excavation without the DTSC's prior approval of a Soil Management Plan.

Comment [dtsc29]: Please take sections 6, 7, and 8 out of the body of the document. Change the section 6 title to "Community Profile" and provide the information in 3.3.10 of the PEA Guidance. Change the section 7 title to "Recommendations", provide a brief summary of the report, provide a brief summary of what the land-use restriction documents are and include the actual draft documents as appendices. I gave Ben examples of these documents. See section 3.3.11.2 of the PEA Guidance.

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6.4 Access for the DTSC.

The DTSC shall have reasonable right of entry and access to the property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the DTSC in order to protect the public health or safety, or the environment.

6.5 Access for Implementing O&M.

The entity or person(s) responsible for implementing the O&M Agreement shall have reasonable right of entry and access to the property for the purpose of implementing the O&M Agreement for the life of such Agreement, anticipated to be in effect in perpetuity.

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7.0 ENFORCEMENT

7.1 Enforcement.

Failure of the Covenantor, Owner or Occupant to comply with any of the Restrictions specifically applicable to it shall be grounds for the DTSC to require that the Covenantor or Owner modify or remove any improvements

("Improvements" herein shall mean all buildings, roads, driveways, and paved parking areas), constructed or placed upon any portion of the property in violation of the Restrictions. Violation of this Covenant shall be grounds for the DTSC to file civil or criminal actions as provided by law.

The corners of the deed restricted areas must be marked with a permanent surveyed monument/marker (i.e., a flush survey marker or flat engraved stone feature) installed into the ground (but may be flush with the ground) that provides a notice that the area is subject to a deed restriction with the DTSC and specifies the San Joaquin County recording information As an example, the marker might read, "This is the (Southeast) corner of a parcel subject to a deed restriction recorded in San Joaquin County on Month, Day, Year at Book __ and Page ___. This deed restriction was recorded because hazardous substances are present on this parcel that do not allow for unrestricted use. Human contact with the soils of this parcel should be avoided. The (Northeast) corner is ### feet from this marker. The (Southwest) Corner is ### feet from this marker";

The current property owner and any subsequent property owner(s) are responsible for the DTSC's costs in administering of the deed restriction pursuant to 22 CCR § 67391.1(h); and

These land use restrictions will run with the land in perpetuity unless a variance is granted under Health and Safety Code section 25233 or termination is granted under Health and Safety Code section 25234. Therefore, to ensure that the deed restriction is effective in preventing exposure to the hazardous substances that remain on the property an annual report must be filed with the DTSC. This annual report, filed under penalty of perjury by the then current owner(s), shall certify that the property is being used in a manner consistent with the terms of the deed restriction, and specify all monitoring or maintenance efforts taken to ensure compliance with the deed restriction's terms. If the property owner identifies any violations of the deed restriction, the property owner must, within 90 days of identifying the violation, determine the identity of the party in violation, send a letter advising the party of the violation of the deed restriction and a demand that the violation cease immediately. Such letter shall be sent by certified mail with return receipt and signature required. Additionally, copies of any correspondence related to the enforcement of the deed restriction shall be sent to the DTSC within ten days of its original transmission.

The DTSC would also require a survey of the property that would be subject to the deed restriction. After recording, this deed restriction would be posted on DTSC's Internet Website because of the requirement to post all deed restrictions entered into by DTSC as specified in Health and Safety Code section 57012. Therefore, an exhibit that depicts the property's written legal description would need to be provided in both hard copy and digital formats as a component of the enforcement and implementation measures taken to ensure notice and compliance regarding the deed restriction. The digital version of the exhibit would delineate the boundary of the deed restricted property and include the digitizing method used (GPS, etc.) along with the datum and the projection used in producing the digital version of the exhibit that depicts the area subject to the deed restriction.

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8.0 DRAFT OPERATION AND MAINTENANCE AGREEMENT

Sections 8.0 through section 8.19 provide elements of an operation and maintenance agreement that were proposed by the DTSC. These draft elements are proposed to be included in a separate document entitled "OPERATION AND MAINTENANCE", which when finalized, will be recorded in the San Joaquin County Recorders office.

The property is currently owned by PureGro Company. The 2.3 acre property, that is the subject of this Agreement, is located at 19783 State Route 26 (a.k.a. East Main Street), Linden, California and is depicted on **Figure 1**. The property, totaling 2.3 acres is more particularly described in Section 2.0 and depicted in **Figure 3.** A location site map showing the location of the property is attached as **Figure 2**.

AGREEMENT

The parties hereto, based upon the foregoing and in exchange for the mutual performances and forbearances described below, agree as follows:

8.1 Obligations of PureGro Company.

The Respondent, PureGro Company agrees to the requirements outlined in the deed restriction and this Agreement into perpetuity, unless a modification to this Agreement is proposed in writing to the DTSC.

8.2 Implementation of Operation and Maintenance (O&M) Plans.

Respondent shall implement the O&M requirements and annual inspections and annual reporting requirements outlined in this Agreement and the Deed Restriction for the fence installed around the property. The property has soils in the sub-surface that contains arsenic and nitrates at concentrations that are not acceptable for an unrestricted land use. The chain link fence that has been installed around the property to prevent public access shall be left in place and maintained as long as the hazardous materials remain on the property.

8.3 Modifications.

Respondent(s) shall give the DTSC at least sixty (60) days advance written notice prior to the intended date of any proposed modifications or other disruption of the chain link fence installed around the property. The written notice shall be sent by certified mail to the DTSC at the address set out in Paragraph 11.0 of this Agreement. The written notice to the DTSC shall include a detailed description of the work to be done or modifications to be made and a map showing the exact location of the proposed work and the reasons for modification or disruption.

8.4 Fencing and Maintenance Requirements.

The fencing installed around the property shall ensure that the property remains secured. The fencing shall be maintained for as long as the hazardous materials remain on the property. Upon identifying that the security provided by the fence has been compromised (e.g., damaged or portions of the fence removed or cut by trespassers), the fence shall be temporarily secured to prevent access and then permanent repairs conducted as soon as possible. Under no circumstances will the fence remain in disrepair for a period longer than thirty (30) days following discovery of damage. Further, the condition of the fence and any required maintenance shall be evaluated as part of the annual inspections of the area outlined in 8.6 below.

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8.5 Signs Marking the Deed Restricted property.

Signs indicating that the area is subject to a deed restriction shall be posted so they are visible from the surrounding area and any existing or proposed routes of entry to the property. The sign posts and monuments installed along the northern, eastern, southern and western perimeters of the property area (**Figure 3**) shall ensure that the property remains secure. The sign posts and monuments shall remain in place as long as the hazardous materials remain on the property. Upon identifying that the sign posts and monuments have been compromised, (e.g., damaged, disturbed or removed by trespassers), the marker shall be repaired and replaced as soon as possible. Additionally, the condition of the sign posts and monuments, and any required maintenance shall be evaluated as part of the annual inspections of the area outlined in **Figure 3**. The signs should read "This area is subject to a deed restriction recorded in San Joaquin County on (insert actual recording date in Month, Day, and Year format) in Book ___ and Page ___. (Insert actual Book and Page numbers.) This Deed Restriction was recorded because arsenic and nitrates released during past site activities are present in concentrations on this parcel that do not allow for unrestricted use. Human contact with the sub-surface soil on this parcel should be avoided. For more information regarding the former PureGro Linden Facility, Deed Restriction, please contact the Department of Toxic Substances Control at (916) 255-3776".

The owner shall post and maintain all signs on the perimeter fencing and the monuments as set forth in the deed restriction. The four corners of the parcel shall have concrete monuments with signs that do not exceed 4 feet in total height. The plaque shall bear the necessary warning language as set forth here and in the Deed Restriction identifying that hazardous substances remain on the property at levels that do not allow for unrestricted use and that any contact with or disturbance of these soils is prohibited by the deed restriction. In addition to the monument signs at the corners of the parcel, there shall be a minimum of one sign on the eastern and western facing fence lines that shall include similar language and that shall be visible at all times from the site access gates as depicted in **Figure 3**. The monuments, plaques, signs, and fencing shall be made of a material able to withstand the elements, and shall be monitored periodically to ensure that they remain intact.

8.6 Annual Reporting Requirement.

Section 67391.1 of title 22, division 4.5, chapter 39 of the California Code of Regulations titled "Requirements for Land Use Covenants" (22 CCR § 67391.1) requires an implementation and enforcement plan to address the monitoring and maintenance requirements necessary to ensure that prohibited uses are not occurring on the deed restricted property. This implementation and enforcement plan will be in the form of an annual inspection of entire fence, and an annual report. This Annual Report shall be filed with the DTSC by January 15th of each calendar year subsequent to the recording of the deed restriction and shall note how all the requirements outlined in this Agreement have been met. This annual report filed under penalty of perjury by the then current owner(s), shall certify that the property is being used in a manner consistent with the terms of the deed restriction, and specify all monitoring or maintenance efforts outlined in the deed restriction and this Agreement have been taken to ensure compliance with the deed restriction's terms. If the property owner identifies any violations of the deed restriction during the quarterly or annual inspection, the property owner must, within 90 days of identifying the violation, determine the identity of the party in violation, send a letter advising the party of the violation of the deed restriction and a demand that the violation cease immediately. Such letter shall be sent by certified mail with return receipt and signature required.

The annual report must include the dates, times, and names of reviewers who conducted the annual inspections. It also shall describe how the observations were performed that were the basis for the statements/conclusions in the annual report (e.g. drive by, fly over, walk in, etc.). The annual report must also certify that the signs on the fence were present and visible and legible during the annual inspections. If violations are noted by the observer, the annual report must detail the steps taken to return to compliance.

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Additionally, copies of any correspondence related to the enforcement of the deed restriction shall be sent to the DTSC within ten days of its original transmission.

8.7 Emergency Response Action/Notification.

In the event of any action or occurrence (such as a fire, flood, earthquake, explosion, or human exposure to hazardous substances caused by the release or threatened release of a hazardous substance) during the course of this Agreement, Respondent shall immediately take all appropriate action to prevent, abate, or minimize such emergency, release, or immediate threat of release and shall immediately notify the DTSC Project Manager. Respondent shall take such action in consultation with the Project Manager and in accordance with all applicable provisions of this Agreement. Within seven days of the onset of such an event, the Respondent shall furnish a report to the DTSC, signed by the Respondent's Project Coordinator, setting forth the events which occurred and the measures taken in the response thereto. In the event that Respondent fail to take appropriate response and the DTSC takes the action instead, Respondent shall be liable to the DTSC for all costs of the response action. Nothing in this section shall be deemed to limit any other notification requirement to which the Respondent may be subject.

8.8 Obligations of the DTSC.

The DTSC agrees to review and oversee the activities performed pursuant to the Deed Restriction and this Agreement.

8.9 Project Coordinator.

The responsibilities of the Respondents Project Coordinator will be to receive and submit all notices, comments, approvals, and other communications from and to the DTSC. Respondent shall promptly notify the DTSC of any change in the identity of the Project Coordinator.

8.10 Submittals.

All submittals and notifications from Respondent that are required by this Agreement shall be sent simultaneously to:

Mr. James L. Tjosvold, P.E., Chief
Attn: Maria Gillette, (2 copies)
Northern California-Central Cleanup Operations Branch
Site Mitigation and Brownfields Reuse Program
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826-3200

8.11 Communications.

All approvals and decisions of the DTSC made regarding submittals and notifications will be communicated to the Respondent in writing by the Site Mitigation Branch Chief, Department of Toxic Substances Control, or his/her designee. Confirmation of a designation shall be provided in writing by the DTSC in order to validate any approvals or decisions made by a Branch Chief's designee. No informal advice, guidance, suggestions or comments by the DTSC regarding reports, plans, specifications, schedules or any other writings by the Respondent shall be construed to relieve the Respondent of the obligations to obtain such formal approvals as may be required.

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8.12 DTSC Review and Approval.

(a) If the DTSC determines that any report, plan, schedule or other document submitted to the DTSC for approval pursuant to this Agreement fails to comply with this Agreement or fails to protect public health or safety or the environment, the DTSC may: (1) modify the document as deemed necessary and approve the document as modified; or (2) return comments to the Respondent with recommended changes and a date by which the Respondent must submit to the DTSC a revised document incorporating the recommended changes. (b) Any modifications, comments or other directive issued pursuant to (a) above, are incorporated into this Agreement. Any noncompliance with these modifications or directives shall be deemed a failure or refusal to comply with this Agreement.

8.13 Stop Work Order.

In the event that the DTSC determines that any activity (whether or not pursued in compliance with this Agreement) may pose an imminent or substantial endangerment to the health or safety of people in the surrounding area or to the environment, the DTSC may order the Respondent to abate the endangerment. In the event that the DTSC determines that any activities are proceeding without the DTSC authorization, the DTSC may order the Respondent to stop such activities for a period of time needed to obtain the DTSC authorization, if such authorization is appropriate.

8.14 The DTSC Required Modifications.

The DTSC may require modifications to the fencing in the event that the fence is not effective at protecting public health, safety or the environment.

8.15 Compliance with Applicable Laws.

The Respondent shall carry out this Agreement in compliance with all applicable local, state, and federal requirements.

8.16 Respondent Liabilities.

Nothing in this Agreement shall constitute or be construed as a satisfaction or release from liability for any conditions or claims arising as a result of past, current or future operations of the Respondent. Nothing in this Agreement is intended or shall be construed to limit the rights of any of the parties with respect to claims arising out of or relating to the deposit or disposal at any other location of substances removed from the property. Nothing in this Agreement is intended or shall be construed to limit or preclude the DTSC from taking any action authorized by law to protect public health or safety or the environment and recovering the cost thereof. Notwithstanding compliance with the terms of this Agreement, the Respondent may be required to take further actions as are necessary to protect public health and the environment.

8.17 Site Access.

Access to the property shall be provided at all reasonable times to employees, contractors or consultants of the DTSC. Nothing in this paragraph is intended or shall be construed to limit in any way the right of entry or inspection that the DTSC or any other agency may otherwise have by operation of any law. The DTSC and its authorized representatives shall have the authority to enter and move freely at the property at all reasonable times for the purposes including, but not limited to: inspecting the chain link fence or signs, and reviewing the compliance of the Respondent in carrying out the terms of this Agreement. The Respondent shall ensure that no conveyance of title, easement or other interest in the property shall be executed (consummated) without incorporating the continued right of entry by the DTSC.

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8.18 Record Retention.

All reports and other documents shall be preserved by the Respondent for a minimum of ten (10) years after the submittal date. If the DTSC requests that some or all of these documents be preserved for a longer period of time, the Respondent shall either comply with that request or deliver the documents to the DTSC, or permit the DTSC to copy the documents prior to destruction. The Respondent shall notify the DTSC in writing at least six (6) months prior to destroying any documents prepared pursuant to this Agreement.

8.19 Modification and Termination.

Respondent(s) may, upon written request, seek modification or termination of this Agreement at any time. In addition to modification as provided elsewhere in this Agreement, this Agreement may be modified or terminated by mutual written agreement of the parties at any time.

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9.0 REFERENCES

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U.S. EPA, 2004. Integrated Risk Information System (IRIS). On-line database. Office of Research and Development, Washington, DC. Updated monthly. http://www.epa.gov/iriswebp/iris/index.html.

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TABLES

FIGURES

APPENDIX A

Voluntary Cleanup Agreement

APPENDIX B

November 22, 2004 Linden County Water District Well Logs and Well Locations

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APPENDIX C

Linden Community Profile

APPENDIX D

Soil Analytical Results

APPENDIX E

July 29, 1987 Sampling Plan for Brea Agriculture Services Facility, Linden, CA

APPENDIX F

February 17, 1992 Preliminary Analytical Results Report

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APPENDIX G

April 14, 1992 Phase 2 Work Proposal

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APPENDIX H

January 12, 1993 PureGro Linden Facility Workplan

APPENDIX I

Spreadsheet for Site-Specific Risk Assessment